

WHAT IS CLAIMED IS

1. A solution jet type fabrication apparatus
for fabricating a wiring pattern or a device, the
5 solution jet type fabrication apparatus comprising:

a jet head for ejecting a droplet of a
solution containing fine particles onto a substrate, so
as to form a pattern, by vaporizing a volatile
ingredient of the solution, and allowing a solid
10 component to remain on the substrate,

wherein the substrate has no liquid absorbing
property,

wherein the jet head includes a nozzle from
which the droplet is ejected, the nozzle being formed
15 from a material that has a greater hardness than that of
the fine particles in the solution,

wherein the nozzle has a size that is equal to
or less than $\Phi 20\mu\text{m}$, the nozzle satisfying a relation of
 $0.0001 \leq D_p/D_o \leq 0.01$, where D_p represents the diameter of
20 each of the fine particles and D_o represents the
diameter of the nozzle,

wherein each of the fine particles has a size
that is equal to or less than the roughness of a surface
of the substrate.

2. The solution jet type fabrication
5 apparatus as claimed in claim 1, wherein the jet head
ejects the droplet using a mechanical displacement force.

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3. The solution jet type fabrication
apparatus as claimed in claim 2, wherein the jet head
ejects the droplet using the mechanical displacement
force so that the droplet becomes spherical immediately
15 before the droplet reaches the substrate.

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4. The solution jet type fabrication
apparatus as claimed in claim 2, wherein the jet head
ejects the droplet using the mechanical displacement
force so that the droplet has an elongated shape along
the ejecting direction without a trailing droplet, and
25 so that the length of the elongated droplet in the

ejecting direction is no more than three times the length of the elongated droplet in a direction perpendicular to the ejecting direction.

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5. The solution jet type fabrication apparatus as claimed in claim 2, wherein the distance
10 between the substrate and the nozzle is 3 mm or less.

15 6. The solution jet type fabrication apparatus as claimed in claim 2, further comprising:
a driving unit that moves at least one of the jet head and the substrate relatively to the other.

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7. The solution jet type fabrication apparatus as claimed in claim 6, wherein the velocity of
25 the relative movement of the jet head and the substrate

is less than the velocity of the ejected droplet.

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8. The solution jet type fabrication apparatus as claimed in claim 1, wherein the jet head ejects the droplet using a growth displacement force of a thermally generated bubble.

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9. The solution jet type fabrication apparatus as claimed in claim 8, further comprising:
a driving unit that moves at least one of the jet head and the substrate relatively to the other.

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10. The solution jet type fabrication apparatus as claimed in claim 9, wherein the velocity of the relative movement of the jet head and the substrate
25 is no more than $1/3$ of the velocity of the ejected

droplet..

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11. The solution jet type fabrication apparatus as claimed in claim 8, wherein the jet head ejects the droplet using the growth displacement force of a thermally generated bubble so that the droplet has an elongated shape along the ejecting direction with a trailing droplet, and so that the length of the elongated droplet in the ejecting direction is no less than five times the length of the elongated droplet in a direction perpendicular to the ejecting direction.

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12. The solution jet type fabrication apparatus as claimed in claim 1, wherein the jet head includes a filter situated at an upstream location of the nozzle.

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13. The solution jet type fabrication apparatus as claimed in claim 12, wherein the filter is situated at a position nearest to the nozzle.

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14. The solution jet type fabrication apparatus as claimed in claim 13, wherein the filter traps a foreign particle with a size equal to or greater than 30 times the diameter of the fine particle.

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15. A solution used for a solution jet type fabrication apparatus for fabricating a wiring pattern or a device, the solution jet type fabrication apparatus having a jet head for ejecting a droplet onto a substrate, so as to form a pattern, by vaporizing a volatile ingredient of the solution, and allowing a solid component to remain on the substrate, the substrate having no liquid absorbing property, the jet head including a nozzle from which the droplet is

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ejected, the nozzle having a size that is equal to or less than $\Phi 20\mu\text{m}$, the solution comprising:

fine particles where each of the fine particles has a size that is equal to or less than the roughness of a surface of the substrate, the fine particles satisfying a relation of $0.0001 \leq D_p/D_o \leq 0.01$, where D_p represents the diameter of each of the fine particles and D_o represents the diameter of the nozzle, and the fine particles having a hardness less than that of a material of the nozzle.

16. A substrate used for a solution jet type fabrication apparatus for fabricating a wiring pattern or a device, the solution jet type fabrication apparatus having a jet head for ejecting a droplet of a solution containing fine particles onto a substrate, so as to form a pattern, by vaporizing a volatile ingredient of the solution, and allowing a solid component to remain on the substrate, the jet head including a nozzle from which the droplet is ejected, the nozzle being formed from a material that has a greater hardness than that of the fine particles in the solution, the nozzle having a

size that is equal to or less than $\Phi 20\mu\text{m}$, the nozzle satisfying a relation of $0.0001 \leq D_p/D_o \leq 0.01$, where D_p represents the diameter of each of the fine particles and D_o represents the diameter of the nozzle, the

5 substrate comprising:

an electrode area on which the wiring pattern is formed,

wherein the substrate has no liquid absorbing property,

10 wherein the substrate has a surface having a roughness that is equal to or greater than the size of each of the fine particles.

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17. The substrate as claimed in claim 16, wherein the electrode area is formed as a rectangular pattern, wherein a corner of the rectangular pattern is
20 chamfered.

25 18. The substrate as claimed in claim 16,

wherein the electrode area is formed as a combination of rectangular patterns, wherein a corner of each of the rectangular patterns is chamfered.

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19. The substrate as claimed in claim 16,
wherein the electrode area is formed as a rectangular
10 pattern, wherein a corner of the rectangular pattern is
covered with one or more round-shaped dots.

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20. The substrate as claimed in claim 16,
wherein the electrode area is formed as a combination of
rectangular patterns, wherein a corner of each of the
rectangular patterns is covered with one or more round-
20 shaped dots.

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21. The substrate as claimed in claim 16,

wherein the electrode area is formed as a pattern of one or more round-shaped dots by ejecting a droplet of a solution containing fine particles onto the substrate, so as to form the pattern, by vaporizing a volatile
5 ingredient of the solution, and allowing a solid component to remain on the substrate.

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22. The substrate as claimed in claim 16, wherein the wiring pattern is a strip-like pattern extending in parallel to two perpendicular directions, the strip-like pattern being formed of a combination of
15 round-shaped dots.

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23. The substrate as claimed in claim 16, wherein the strip-like pattern has a portion that is bent in a right angle, wherein an outer area of the bent portion is formed as a curve.

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24. A substrate used for a solution jet type
fabrication apparatus for fabricating a wiring pattern
5 or a device, the solution jet type fabrication apparatus
having a jet head for ejecting a droplet of a solution
containing fine particles onto a substrate, so as to
form a pattern, by vaporizing a volatile ingredient of
the solution, and allowing a solid component to remain
10 on the substrate, the jet head including a nozzle from
which the droplet is ejected, the nozzle being formed
from a material that has a greater hardness than that of
the fine particles in the solution, the nozzle having a
size that is equal to or less than $\Phi 20\mu\text{m}$, the nozzle
15 satisfying a relation of $0.0001 \leq D_p/D_o \leq 0.01$, where D_p
represents the diameter of each of the fine particles
and D_o represents the diameter of the nozzle, the
substrate comprising:

an electrode area on which the device is
20 formed,

wherein the substrate has no liquid absorbing
property,

wherein the substrate has a surface having a
roughness that is equal to or greater than the size of
25 each of the fine particles.

5 25. The substrate as claimed in claim 24,
wherein the electrode area is formed as a rectangular
pattern, wherein a corner of the rectangular pattern is
chamfered.

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 26. The substrate as claimed in claim 24,
wherein the electrode area is formed as a combination of
15 rectangular patterns, wherein a corner of each of the
rectangular patterns is chamfered.

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 27. The substrate as claimed in claim 24,
wherein the electrode area is formed as a rectangular
pattern, wherein a corner of the rectangular pattern is
covered with one or more round-shaped dots.

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28. The substrate as claimed in claim 24,
5 wherein the electrode area is formed as a combination of
rectangular patterns, wherein a corner of each of the
rectangular patterns is covered with one or more round-
shaped dots.

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29. The substrate as claimed in claim 24,
wherein the electrode area is formed as a pattern of one
15 or more round-shaped dots by ejecting a droplet of a
solution containing fine particles onto the substrate,
so as to form the pattern, by vaporizing a volatile
ingredient of the solution, and allowing a solid
component to remain on the substrate.

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30. The substrate as claimed in claim 24,
25 wherein the device is a strip-like pattern extending in

parallel to two perpendicular directions, the strip-like pattern being formed of a combination of round-shaped dots.

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31. The substrate as claimed in claim 24, wherein the strip-like pattern has a portion that is bent in a right angle, wherein an outer area of the bent portion is formed as a curve.

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32. A method for fabricating a wiring pattern or a device, the method comprising the steps of:

ejecting a droplet of a solution containing fine particles onto a substrate, by using a jet head;

20 vaporizing a volatile ingredient of the solution; and

allowing a solid component to remain on the substrate,

wherein the substrate has no liquid absorbing property,

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wherein the jet head includes a nozzle from which the droplet is ejected, the nozzle being formed from a material that has a greater hardness than that of the fine particles in the solution,

5 wherein the nozzle has a size that is equal to or less than $\Phi 20\mu\text{m}$, the nozzle satisfying a relation of $0.0001 \leq D_p/D_o \leq 0.01$, where D_p represents the diameter of each of the fine particles and D_o represents the diameter of the nozzle,

10 wherein each of the fine particles has a size that is equal to or less than the roughness of a surface of the substrate.